



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/550,682	07/31/2006	Katsumi Shibayama	46884-5426	8343
55694 7590 01/15/2009 DRINKER BIDDLE & REATH (DC) 1500 K STREET, N.W. SUITE 1100 WASHINGTON, DC 20005-1209				
EXAMINER				
PATEL, REEMA				
ART UNIT		PAPER NUMBER		
2812				
MAIL DATE		DELIVERY MODE		
01/15/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/550,682

Applicant(s)

SHIBAYAMA, KATSUMI

Examiner

REEMA PATEL

Art Unit

2812

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-5, 10, 12, 14 and 16 is/are pending in the application.
- 4a) Of the above claim(s) 16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-5, 10, 12 and 14 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 August 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

This action is in response to an amendment filed 9/15/08.

Election/Restrictions

1. Newly submitted claim 16 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons:

- I. Claim 16, drawn to a method of manufacturing a radiation detector, classified in class 438, subclass 57.
- II. Claims 2-5, 10, 12, and 14, drawn to a radiation detector, classified in class 257, subclass 233.

The inventions are distinct, each from the other because of the following reasons:

2. Inventions I and II are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make another and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the product can be made by holding the photodiode array under suction by a chuck other than a flat collet.

Since applicant has received an action on the merits for the originally presented invention (II), this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 16 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 10, 3-5, 12, and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoneta et al. (U.S. 2003/0034496 A1; hereinafter 'Yoneta') in view of Minami et al. (2002/0176158 A1; hereinafter 'Minami'), Homme et al. (U.S. 2003/0001101 A1; 'Homme'), and Yoshida et al. (U.S. 5,386,122; hereinafter 'Yoshida').

5. Regarding claims 10, 3, 12, and 14, Yoneta discloses a photodiode array comprising a semiconductor substrate, wherein a plurality of photodiodes are formed in an array on an opposite surface side to an incident surface of light to be detected ([0038]-[0039]). Additionally, Yoneta discloses forming an anti-reflection film on the side of the incident surface of light to be detected ([0039]).

6. Yet, Yoneta does not disclose the following:

- a) A resin film is provided so as to cover at least regions corresponding to regions where the photodiodes are formed on a side of the incident surface of the light to be detected;
- b) A scintillator panel is arranged opposite to the incident surface of the light to be detected;
- c) An optical resin is provided so as to fill a space between a light exit surface of the scintillator panel and the resin film.

7. Regarding (a), Yoneta discloses forming an antireflective film on an entire side of the incident surface of light to be detected which overlaps photodiodes formed on the opposite side of the substrate ([0039]) but does not disclose forming a resin film. However, Minami discloses forming a resin film so as to protect an underlying anti-reflective material on a substrate ([0044]-[0045]). Incorporating a resin film, as taught by Minami, on the anti-reflective film in the invention of Yoneta would result in the resin film covering all the regions corresponding to regions where the photodiodes are formed and on the side of the incident surface of light to be detected. Minami discloses that the thickness of the resin film is less than 100 microns ([0046]) but does not disclose that the thickness must be within the range of 1-50 microns. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to select the resin film thickness to be between 1 and 50 microns, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yoneta with forming a 1-50 micron thick resin film on an incident surface of light to be detected so as to protect an underlying anti-reflective coating.

8. Regarding (b), Yoneta discloses a scintillator panel but discloses that it is formed on the side of the incident surface of light to be detected ([0039]). However, Homme discloses forming a scintillator panel on a side opposite to the incident light surface

([0131]; Fig. 18). Such a configuration reduces image blurring. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Yoneta with a scintillator panel opposite to the incident surface of detected light, as taught by Homme, so as to reduce image blurring.

9. Regarding (c), Yoneta discloses a scintillator but does not disclose forming an optical resin between the scintillator panel and substrate. However, Yoshida discloses an epoxy or acrylic resin in between a scintillator panel and a substrate containing a photodiode array so as to act as an adhesive (col 5, lines 53-55; col 5, line 63 – col 6, line 4). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Yoneta to provide an optical resin, as taught by Yoshida, so as to adhere the scintillator panel to the photodiode array.

10. Regarding claim 4, Yoneta et al. discloses the semiconductor substrate is provided with an impurity region between the photodiodes adjacent to each other for separating the photodiodes from each other ([0039]).

11. Regarding claim 5, Yoneta et al. discloses a high-impurity-concentration layer of the same conductivity type as the semiconductor substrate is formed on the incident surface side of the light to be detected, in the semiconductor substrate ([0039]).

12. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yoneta et al. (2003/0034496 A1) as modified by Minami et al. (2002/0176158 A1), Homme et al. (U.S. 2003/0001101 A1; 'Homme'), and Yoshida et al. (U.S. 5,386,122) as applied to claim 10 above, and further in view of Allison (U.S. 3,748,546).

13. Regarding claim 2, Yoneta, Minami, Homme, and Yoshida disclose a photodiode array but do not disclose that it contains a plurality of depressions having a predetermined depth. However, Allison discloses forming a plurality of depressions in a photodiode array on the opposite surface side to the incident surface of light to be detected, wherein each said photodiode is formed in a bottom portion of the associated depression (col 2, lines 33-45; col 3, lines 10-21; Fig. 1). The purpose of doing this is to ensure that light that enters the device also enters the space charge region, which henceforth increases the efficiency of the device (col 4, lines 9-21). Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Yoneta as modified by Minami, Homme, and Yoshida with forming a plurality of depressions wherein each photodiode is formed in a bottom portion of the associated photodiode, as taught by Allison, so as to increase the efficiency of the photo-detector device.

Response to Arguments

14. Applicant's arguments with respect to claims 2-5, 10, 12, and 14 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to REEMA PATEL whose telephone number is (571)270-1436. The examiner can normally be reached on M-F, 8:00-4:30 ET.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Charles Garber can be reached on (571)272-2194. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Reema Patel/
Examiner, Art Unit 2812
1/13/09

/Alexander G. Ghyka/
Primary Examiner, Art Unit 2812